practically every case of fracture which will yield good results from operation. Such surgeons will not set the stage for a disastrous, perhaps fatal, infection by operating upon bone through an unsafe or contaminated field. Always when they must deal with contaminated fields of operation they will confine their procedures to such cleansing and redressment as is best compatible with the patient's safety. Practically never will they introduce foreign body fixation into a contaminated field. They will play safe rather than take a gambler's chance on saving time or obtaining a particularly quick and brilliant result.

I have gotten good results in cases similar to Doctor Adams' Case No. 7 (an extensively comminuted, compounded and contaminated fracture of both bones just above the ankle joint) by conservative methods, using a Thomas splint, celluloid-acetone adhesive foot piece for traction and Carrell-Dakin irrigation of the wound. For safety sake I do not use internal foreign body fixation on such cases.

I once knew a youth who, while handling dynamite, always put the giant-powder cap into his mouth and crimped it upon the fuse with his teeth. Cap-crimping pliers were provided, but this youth said he knew a man whose hand was blown off while crimping a cap with pliers. For himself, he preferred to crimp them delicately with his teeth. If the cap exploded, well—at least he would not be a cripple. I think such reasoning should never be applied in bone surgery.

*

N. Austin Cary, M. D. (2939 Summit Street, Oakland).—Doctor Adams, I am sure, has a clear insight into the fracture situation. He impresses me with the belief that as the result of experience he approaches the problem of difficult fractures with but one thought in mind—the ultimate end results.

It must be remembered there is no one method applicable to all fractures. Manipulation, traction (both skin and skeletal), and open reduction all play their rôle and will, in given cases, be of use in turn. The proper choice must be the result of experience over a long period.

Our experiences in these fractures follow fairly fixed principles. Reduction is necessary for good functional results, not necessarily to correct overriding as much as alignment to assure normal function. At times this can only be obtained by open reduction; with the laws of good surgery governing, there should be little difficulty.

In open reductions I would urge a greater respect for the soft tissues, especially about the site of fracture, as I believe this occasions most of our delayed unions and nonunions. This, with inadequate fixation and the use of inadequate materials, give the greater number of poor results. At times there is too much fussing with a good functional result trying to obtain an ideal x-ray result. Functional results should always be our criteria of treatment.

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Doctor Adams (Closing).—I wish to thank Doctors Cleary, Dukes, and Cary for their frank and instructive discussions. I do not wish to convey the impression that wholesale open reductions be done on fractured bones, for it will be noted that I presented two case records where the conservative closed reduction was done. However, I do feel that too often we see great disability due to stiffened joints and muscular atrophy caused by such long periods of necessary immobilization, especially when nonunion or bad deformity has resulted after two or three months, and then more immobilization superimposed because a delayed operation has become necessary for their correction. These stiffened joints and muscle damage so frequently cause irreparable long and permanent disability and could have been avoided if early operation had been done.

Now remember, I am referring to those cases where the skin and soft tissues are in good condition. If these are contaminated and in poor condition, then such time should elapse for their complete healing before operating. That is only sound surgical judgment. Our doctors are now so thoroughly trained and warned of the dangers and pitfalls of fractures that affirmation on the part of the orthopedists for earlier and more frequent open bone work would not result in wholesale operations by everyone in all fractures. Open bone work was looked upon with horror and dread—justly so, years ago. With the present-day teachings, improvement of technique, better trained surgeons, and our excellent hospital facilities, those dangers are little as compared with the numbers of poor results obtained by a forced operation after too long immobilization and extension when the injured's resistance has become extremely low. I say if fractures of the long bones, when uncomplicated, cannot be reduced, conservatively, in six to ten days, do the open operation. In these cases, especially of the legs, weight bearing can be started with safety and without bowing, much earlier than could possibly happen if treated by the closed method.

BLOOD PRESSURE AND GOITER*

By John Martin Askey, M. D.
AND
Clarence G. Toland, M. D.
Los Angeles

Discussion *by Robertson Ward, M. D., San Francisco; B. O. Raulston, M. D., Los Angeles; John C. Ruddock, M. D., Los Angeles.*

THYROTOXICOSIS is a commonly accepted cause for hypertension and must be ruled out in the study of any patient with high blood pressure of undetermined origin.

This is the prevailing impression despite certain experimental evidence pointing to the contrary. Intravenous injection of extracts of exophthalmic goiters by Blackford, Sandiford, and others has produced marked reduction of the blood pressure and has indicated the presence of a depressor substance in the thyroid extract. Reduction occurred only with exophthalmic goiter extracts, not with adenomas, colloid goiters or normal thyroids, and occurred only after the first injection. Apparently a tolerance toward further injections was established.

Some have reported cases tending to show low blood pressure as the typical finding in exophthalmic goiter, but the groups studied have been small.

On the other hand, Plummer in 1915 found a high percentage of hypertension in goiter patients over forty, namely, 47 per cent of the hyperplastic group and 35 per cent of the nonhyperplastic group.

TYPICAL BLOOD PRESSURE IN EXOPHTHALMIC GOITER

The blood pressure typically described in exophthalmic goiter is that of an elevated systolic pressure with a normal or lowered diastolic and a consequent elevation of the pulse pressure. The peripheral vasomotor phenomena, with the wide-open capillaries aiding in heat dissipation, tend toward a lowered diastolic pressure, and the increased systolic pressure is considered compensa-

* Read before the July meeting of the American Association for the Study of Goiter at Seattle, Washington.

tory toward maintenance of a normal diastolic pressure. The systolic has been considered as increasing more or less directly with the basal metabolism and the pulse pressure has been advanced as a measure of the basal metabolism.

USUAL PICTURE IN TOXIC ADENOMATOUS GOITER

No such typical picture occurs with the toxic adenomatous goiter. Hypertension here is usually due to a concomitant elevation of the systolic and diastolic pressure, and is somewhat similar to that seen in arteriosclerosis. The peripheral flushing, sweating, and vasomotor changes are less marked in toxic adenomas, and could explain the absence of a low diastolic pressure. These are the commonly accepted views regarding blood pressure and thyrotoxicosis.

STUDY OF FIVE HUNDRED AND FIFTY RECORDS

The failure of many of our patients with thyrotoxicosis of marked degree to show any elevation of pressure led us to study a representative group with the following thoughts:

Is the production of hypertension an invariable sequela of thyrotoxicosis?

In what percentage does it occur?

How often does low blood pressure occur?

What is the effect of thyroidectomy?

Which cases respond best to thyroidectomy?

We determined the percentage of patients with high, normal, and low blood pressure and compared them with figures as nearly normal as could be obtained. Exton's figures obtained for those applying for insurance over a period of years were used. The standards adopted for high pressure and low pressure readings were arbitrary. Regardless of age, a systolic pressure over 150, or a diastolic pressure over 110, was regarded high. Systolic pressures below 110 were considered low.

An analysis was made of the last 550 records on the service of Dr. Clarence G. Toland. Over 90 per cent were women. Thirty and six-tenths per cent of the toxic patients had hypertension and two per cent had elevation of blood pressure above that normal for their age, but not over 150. Exton found 4.3 per cent of normal women had hypertension.

TABLE 1.—*Analysis of 444 Toxic Goiter Patients (Basal Metabolic Rate Average Plus 33) as to Preoperative Blood Pressure*

	Number of patients	Per cent	Per cent in normal women (Exton)
Normal pressure	275	62.0	87.6
Hypertension (above 150)	136	30.6	4.3
Hypertension (high for age) (not over 150)	9	2.0	
Low pressure	24	5.4	8.1

TABLE 2.—*Comparison of 100 Toxic Goiter Patients With Hypertension With 100 Toxic Goiter Patients With Normal Blood Pressure*

	Type of Goiter		Average Age	History of family cardiovascular disease
	Exophthalmic	Toxic adenoma		
Hypertension	29	71	49.3	26
*Normal blood pressure	34	62	38.3	36

* Of the remaining four patients of the 100, three had malignant adenomas, and one localized arteriosclerosis.

Five and four-tenths per cent of our toxic patients had low blood pressure. Normally, Exton found 8.1 per cent. The percentage of hypertension was slightly higher in the toxic adenomas than in the exophthalmic goiters.

Thyrotoxicosis thus produced definite hypertension in about one-third of this group and did not appreciably change the percentage of patients with low blood pressure from that found in a normal group. These results thus fail to substantiate the experimental findings obtained by intravenous injection of extracts of toxic goiters, where a definite drop in blood pressure occurred.

As the basal metabolism rate average of this group was plus 33, it is evident that thyrotoxicosis does not invariably invoke elevated blood pressure, and that in this group over two-thirds failed to show any elevation of pressure.

Of the 33 per cent showing definite hypertension, the exophthalmic goiter patients showed, on an average, the pulse pressure increased more than the adenomatous patients, as was expected; but individually there was no definite correlation between the height of the basal metabolism and the height of the pulse pressure. A high pulse pressure did not always occur with a high basal metabolic rate. Comparison of one hundred records of toxic goiter with hypertension, with one hundred records of toxic goiter with normal pressure indicated a greater tendency of the toxic adenomas toward hypertension. As would be expected, the average age of the hypertension group was higher but, strangely, there was a smaller percentage of these patients with a family history of cardiovascular disease. These findings merely strengthen the impression that the greater the duration of the thyrotoxicosis the more probably hypertension will develop.

Following thyroidectomy, of one hundred toxic thyroid patients with hypertension, forty-seven had returned to normal pressure, thirty-three showed reduction of pressure but not to normal, and twenty showed no individual improvement and, on the average, actually became worse.

The exophthalmic goiter patients, a group with a lower average age and a higher average basal metabolic rate, showed a greater tendency to return to normal than the toxic adenomatous patients. Of the twenty whose pressure actually

TABLE 3.—*Results in Blood Pressure After Thyroidectomy in One Hundred Toxic Goiter Patients*

Blood pressure	Report of 100 patients	Age	Basal Metabolism	Pressure Before	Pressure After
Reduction to normal	47	45.9	Plus 41	165 87	136 80
Improvement but not normal	33	49.7	Plus 34	184 91	161 89
No improvement or worse	20	50	Plus 35	160 85	171 98

became worse, 75 per cent had toxic adenomas and averaged fifty years of age. Most of these showed either generalized arteriosclerosis, myocardial or renal damage.

COMMENT

The duration of the exophthalmic goiter is more transient and the toxicity, on the average, more intense. Most of these patients come to operation within the first year after the onset of symptoms. These develop the vasomotor phenomena lacking in the patient with typical toxic adenoma.

The toxic adenomatous patient, however, comes to operation after about fifteen years. The cardiovascular system has been subjected to a slow, persistent irritation which manifests itself in myocardial damage and arteriosclerosis.

It is thus logical that the blood pressure of the toxic adenomatous patient should show less tendency toward reduction by thyroidectomy than the patient with exophthalmic goiter where the elevation of systolic pressure is due to a transient toxicity rather than definite arterial damage.

CONCLUSIONS

1. Thyrotoxicosis in a group studied produced elevation of blood pressure in about 33 per cent.

2. Thyrotoxicosis did not invariably cause elevated blood pressure, the majority apparently being within normal limits.

3. About 80 per cent with hypertension showed improvement of blood pressure after thyroidectomy, 47 per cent being reduced to normal.

4. Apparently the older the patient the greater the toxicity of the goiter; the longer the duration of the thyrotoxicosis (as in the toxic adenoma) the greater the tendency toward hypertension.

1930 Wilshire Boulevard.

DISCUSSION

ROBERTSON WARD, M. D. (384 Post Street, San Francisco).—In attempting to reach a prognosis of hypertension, associated with toxic goiter, one must be particularly careful to distinguish between the two distinct types of toxic goiter, exophthalmic and adenomatous. To attempt to draw a conclusion by study of a mixed group is almost certain to lead to false conclusions. There are two reasons why this is true: first, the average age at operation for exophthalmic goiter is about thirty-three, while that for toxic adenoma is about forty-seven; and second, the average duration of toxicity before operation is about one and one-half years in exophthalmic goiter and fifteen years in toxic adenoma.

From these findings, one would be led to suspect that the prognosis for a return to normal blood pressure, following operation, would be far better in the exophthalmic than in the adenomatous type. If we had available the data from which Doctor Askey and Doctor Toland compiled their paper, I feel sure that this would be found true. Because of the younger age and shorter duration of symptoms, we would find that hypertension—due to exophthalmic goiter—is brought to normal, or at least much lowered, by treatment in all patients, except the percentage expected in normal individuals. In toxic adenoma, it is a different story. The arteriosclerosis, resulting from ten to fifteen years of toxicity, and the rather advanced age at which these patients are treated, makes the prognosis for a return to normal blood pressure very much less likely.

This has been suggested by the authors when they state that fifteen of twenty patients, whose hypertension was not improved by operation, were of the adenomatous type.

Unless these findings are understood in this light, we will find ourselves frequently disappointed in the hypertension due to adenomatous goiter. We must be particularly guarded in our prognosis with regard to the hypertension phase in these patients. On the other hand, a patient who has hypertension, associated with exophthalmic goiter, may reasonably be expected to return to normal blood pressure when the toxic goiter is removed.

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B. O. RAULSTON, M. D. (2007 Wilshire Boulevard, Los Angeles).—There are so many factors to be considered in the study of hypertension that one welcomes any information concerning the problem, and especially the record of such carefully made observations as constitute the basis of the report made by Doctors Askey and Toland. Diagnosis, plan of management and results that may reasonably be expected in the treatment of any given condition of impaired health, depend to a large degree for their accuracy and success upon making use of knowledge that has accumulated from the type of careful study represented here.

The sharp lines that are drawn by specialization in medical practice are frequently not conducive to alertness in making general observations. It is easy to imagine a physician dealing with a patient whose blood pressure is above average without thinking seriously of the possibility of thyroid disease as being related to it, and of dealing with one suffering from disturbed thyroid function without relating it to such circulatory changes as produce hypertension. The ability to determine whether these two conditions are related, frequently requires careful analysis of all available data, and even then one cannot always feel certain of knowing how much independence of cause may be back of either of the conditions.

That the thyroid has a marked influence upon the vascular system, especially the vasomotor apparatus,

is well known. Abnormal variations in thyroid activity over long periods may easily result in organic changes in the circulatory mechanism where only functional disturbances were produced in the early stages of the disease. The observations made by the authors indicate such a relationship between duration of abnormal thyroid activity and permanency of change in the vascular system.

Having these things in mind should be a valuable aid in the study of patients presenting such problems.

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JOHN C. RUDDOCK, M. D. (1930 Wilshire Boulevard, Los Angeles).—Statistics of this character are very valuable to the advancement of medical practice. In addition, these figures help with others of like nature to dispel various axioms and dogmatic statements concerning the phenomena associated with thyroid dysfunction.

Abnormal blood pressure is a symptom which may be due to a great many factors other than thyroid disease. However, we are dealing in this paper only with those patients who have an additional factor, namely, goiter. It has been shown by other authors that the effect of the thyroid on the heart is through the sympathetic nervous system, and that the symptomatic phenomena accompanying thyroid disease (exophthalmic goiter and toxic adenoma) are identical to those found in sympathetic neurosis.

In the goiter patient we have three additional factors which are not found in patients without goiters:

1. Heart hurry (tachycardia).
2. Vasomotor instability.
3. Toxicosis (thyroid).

The authors have called attention to the vasomotor instability as being responsible for lowered diastolic pressure, and have called attention to work by Blackford, Sandiford, and others, concerning the effect of injecting toxic thyroid extracts, and producing only a transient depressor effect.

With all other factors remaining normal, heart hurry (tachycardia) alone is all-important in the height of systolic pressures. It is true that tachycardia may also be, in certain instances, a compensatory phenomenon, when there is a sudden lowering of blood pressure due to a dilated venous circulation as may occur in shock. Tachycardia, however, in thyroid disease is a result of the sympathetic accelerator action from a thyrotoxicosis. I believe that further study of blood pressures in exophthalmic goiters will show that the systolic pressures are in a direct ratio to the pulse rate. This, however, could not apply to toxic adenomas because of the other multitudinous factors, aside from thyroid disease, which enter into the question of hypertension. Doctors Toland and Askey should be complimented on this report, which I feel is only preliminary to a much more extensive one on the same subject.

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DOCTORS ASKEY AND TOLAND (Closing).—The point we particularly wish to bring out is that there is no "typical" blood pressure in thyrotoxicosis. It may be accompanied by hypotension, normal blood pressure, or hypertension. Apparently the majority (62 per cent in our series) have normal pressure. The most of these were adenomatous patients and definitely toxic.

Many, however, were of the exophthalmic type, and failed to show the so-called typical lowering of the diastolic pressure and elevation of the systolic pressure.

The peculiar selectivity by which the thyroid toxin produces hypotension in one individual and hypertension in another has not yet been adequately explained by the physiologists. The discussion has emphasized the better prognosis for reduction of hypertension after thyroidectomy in exophthalmic goiter.

We believe, as does Doctor Ruddock, that tachycardia is largely responsible for hypertension in the exophthalmic goiter patient.

RETROBULBAR NEURITIS AND MULTIPLE SCLEROSIS

SOME OBSERVATIONS WITH QUANTITATIVE CHARTS AND REPORT OF CASE

PART II

By CLIFFORD B. WALKER, M. D.
Los Angeles

DISCUSSION *by Dohrmann K. Pischel, M. D., San Francisco; M. F. Weymann, Los Angeles.*

CASE 2.—Patient came under observation on March 11, 1930. Miss V. E. S. Age, eleven. White.

Complaint.—Sudden blindness in left eye with circumocular pain.

History.—Child has had measles. Chicken-pox, very slight. Never mumps or whooping cough. She is a very athletic, romping youngster, especially as regards basketball and swimming. For two weeks had a "little cold" which took the pleasure out of her games because of tired feeling and leg ache. One week ago, although feeling quite well otherwise, awakened with a dull pain and tenderness in region of left eye and noticed she could hardly see out of left eye. Referred for question of sinus operation. Injury denied. No discoloration of affected parts at any time. X-ray and nose examination already negative by rhinologist.

Fundi show no departure from normal physiological limits, as seen by Dr. La Motte and myself. Color of disks rosy and same in both eyes. Pupils still somewhat dilated from previously used drops.

Vision: Right, 20/30; left, 20/100. Glasses do not improve. Parents and examiners of patient consider vision of right eye as good as ever and unaffected.

Fields: Figures 7 to 9 show both eyes affected in such a way as to suggest that the lesion (neuritis) is probably close to the chiasm or has extended to the chiasm. The fourth or final field on April 18, 1930, was entirely normal within physiologic variations. Space is too limited to reproduce it here. There has been no setback to date.

Comment.—In this case we have apparently the typical field series to be obtained in the typical case of retrobulbar neuritis, outlined in the carefully considered definitions summarized from the literature by Dunphy [15] as a "rather rapid loss of visual acuity, with central scotoma and usually normal but at times varying peripheral fields. There may be pain and tenderness on moving the eyeball. The ophthalmoscopic picture is usually normal. One or both eyes may be affected. There is a definite tendency toward recovery, though in some cases damage is permanent."

It is possible that with the more prevalent use of quantitative perimetry it will be found, as our experience has shown, that the peripheral field can hardly be referred to as normal in most of these patients. To be sure, it is usually normal to ordinary tests, but to the 1/2000 or 2/2000 test objects contractures of the peripheral field are often demonstrable and are frequently more marked on the temporal side at some of the progressive stages. The enlargement of the blind spot may be in this same category that is really a peripheral contracture.

These two cases may be taken as typical of two usual types. The first or more common type in which the central field is depressed first and comes back last, and the second type in which it is depressed last or is more resistant and comes